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EXAMINER

MICHALSKI, JUSTIN I

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 06/03/2004

16

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/658,010

Applicant(s)

BHARITKAR ET AL.

Examiner

Justin Michalski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)          |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. <u>10</u> .  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____.  | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22 recites the limitation "the low pass filter circuit" in lines 8 and 9. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 9-12, 15, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by House (US Patent 4,809,338).

Regarding Claim 1, House discloses a method of providing an automatic loudness compensation circuit (Figure 2) comprising: receiving an input audio signal with a range of frequencies where a lower portion of the range contains a bass content (signal in 46, it is inherent that an audio signal will contain a range of frequencies where a lower portion of the range contains a bass content); coupling the input audio signal to

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a voltage detector having an output voltage (House discloses a full-wave bridge rectifier for detecting the input audio signal which is coupled through circuit 54 on capacitor 100) (Column 4, lines 59-63); coupling the output voltage of the voltage detector to a filter circuit (LED 104 is optically coupled to resistor 64) for adjusting a corner frequency associated with the filter circuit such that the corner frequency is inversely related to the input audio signal for boosting the bass content of the input audio signal (House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal, i.e. filter allows less low frequency components by changing the corner frequency of the circuit) (Column 5, lines 6-16); and coupling an output of the filter circuit (input to terminal 6) to a power amplifier (Circuit 54) for amplifying the filter circuit output.

Regarding Claim 2, House further discloses driving an audio speaker (38) with the amplified filter circuit output (circuit 54 amplifies filter output from terminal 6).

Regarding Claim 9, it is well known in the art that audio signals can originate from compact discs.

Regarding Claim 10, it is well known in the art that audio signals can originate from cassettes.

Regarding Claim 11, it is well known in the art that audio signals can originate from digital videodiscs.

Regarding Claim 12, it is well known in the art that audio signals can originate from microphones.

Regarding Claim 15, House discloses a method of providing an automatic loudness compensation circuit (Figure 2) comprising: receiving an input audio signal with a range of frequencies where a lower portion of the range includes a bass content (signal in 46, it is inherent that an audio signal will contain a range of frequencies where a lower portion of the range contains a bass content); coupling the input audio signal to a voltage detector to produce an output voltage (House discloses a full-wave bridge rectifier for detecting the input audio signal which is coupled through circuit 54 on capacitor 100) (Column 4, lines 59-63); coupling the output voltage of the voltage detector to a control circuit (LED is optically coupled to resistor 64), the control circuit comprising a filter circuit (capacitor and resistor network including resistor 64); comparing a corner frequency associated with the filter circuit to the strength of the input audio signal; shifting the corner frequency such that the corner frequency is inversely related to the strength of the input audio signal (House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal, i.e. filter allows less low frequency components by changing the corner frequency of the circuit) (Column 5, lines 6-16); coupling an output of the filter circuit (input to terminal 6) to a power amplifier (54) for amplifying the

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filter circuit output; and driving an audio speaker (38) with the amplified filter circuit output (output from terminals 1 and 11).

Regarding Claim 19, House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components by decreasing the corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of House (US Patent 4,809,338).

Regarding Claim 1, Kimura discloses a method of providing an automatic loudness compensation circuit (Figure 1) comprising: receiving an input audio signal with a range of frequencies where a lower portion of the range contains a bass content (Input to A/D Converter, Kimura discloses use with a tape recorder and a Compact Disc player which inherently contain a range of frequencies where a lower portion of the range contains bass content) (Column 1, lines 27-28); coupling the input audio signal to a voltage detector having an output voltage (reference 16); coupling the output voltage

of the voltage detector to a filter circuit (filter 15) for boosting the bass content of the input audio signal based on the volume level of the audio signal (Column 4, lines 58-60); and coupling an output of the filter circuit (Filter 15) to a power amplifier for amplifying the filter circuit output (D/A Converter). Kimura does not disclose the frequency of the filter circuit inversely related to the input audio signal. House discloses a device (Figure 1) which controls the bass contour based upon the signal provided by a power amplifier to a control circuit (Figure 2). House discloses Figure 3 which describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16) in order to enhance the sound quality at lower signal levels as determined by predetermined loudness contours (Column 5, lines 18-21). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Although House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17), Kimura also discloses that a feedback approach may be used to boost signal characteristics (Column 4, lines 60-64). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels as taught by House.

Regarding Claim 12, Kimura further discloses use in audio devices which could include a microphone as an audio device (Column 1, lines 26-28).

3. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over House as applied to claim 1 above, and further in view of Onetti et al. (US Patent 5,812,687).

Regarding Claim 3, House discloses a method as stated apropos of claim 1 above and further discloses a circuit comprising a light emitting device (LED 104) and a light sensitive resistor (resistor 64). House does not disclose the use of a capacitance multiplier circuit. Onetti et al. discloses a circuit for controlling frequency response characteristics of a signal (Figure 8) containing a capacitance multiplier. By selectively changing the resistors  $r_1$ ,  $r_2$ , and  $r_3$  (i.e. variable resistor) with switches  $s_1$ ,  $s_2$ , and  $s_3$  the phase response of the circuit can be obtained by equation by  $f_o = 1/(2\pi RC)$  (Column 4, line 1). Onetti et al. further teaches capacitance multiplying circuits are integrated in order to limit the number of components (Column 2, lines 23-24). Kimura as modified and Onetti et al. both disclose devices that alter the frequency response of a signal using a variable resistor in the form of a light sensitive resistor or a switching circuit. Therefore it would have been obvious to one skilled in the art at the time the invention was made to combine the capacitance multiplier circuit as disclosed by Onetti et al. with the light sensitive resistor disclosed by Kimura in order to reduce the number of components as taught by Onetti et al.

Regarding Claim 4, House further discloses control circuit comprising low-pass filter is connected to the light emitting device and light sensitive resistor (Column 2, lines 26-35).

Regarding Claim 5, House discloses the value of resistor 64 changing as a function of the light intensity of LED 104 (i.e. changing corner frequency of audio signal) (Column 5, lines 5-16).

Regarding Claim 6, House further discloses as the signal level increases the amount of low frequency boost is less (i.e. lowpass filter attenuates less bass as signal increases) (Column 5, lines 18-31).

Regarding Claim 7, House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components by decreasing of corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

Regarding Claim 8, House further discloses as the lower the resistance of the light sensitive resistor the higher will be the frequency of the components of the signal appearing at the input terminal (i.e. less bass content) (Column 5, lines 6-16).

4. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura as modified as applied to claim 12 above, and further in view of Werrbach (US Patent 5,359,665).

Regarding Claim 13, Kimura as modified discloses a method as stated apropos of claim 12 above including a microphone which can be used to control the boosting characteristics of the circuit (Column 4, lines 60-64). Kimura as modified does not disclose the microphone input audio signal coupled to a summing circuit having an output signal. Werrbach discloses a device with an audio input signal (Figure 1) and an audio bass frequency enhancement circuit. The input audio signal (i.e. microphone input) and output of the filter circuit (references 3 and 5) are summed together at combiner 4 having an output signal. Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 – Column 2, line 2). Therefore, it would have been obvious to one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal to produce a dynamically changing frequency response and longer duration of bass frequencies resulting in a higher fidelity audio signal.

Regarding Claim 14, Werrbach further discloses the use of subsequent audio amplifiers which could include a power amplifier (Column 1, lines 13-14).

5. Claims 16-18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over House as applied to claim 15 above in view of Onetti et al. (US Patent 5,812,687).

Regarding Claim 16, House discloses a method as stated apropos of claim 15 above further disclosing a light emitting device (Figure 2, LED 104) coupled to a light sensitive resistor (resistor 64) where the output of the light sensitive resistor (i.e. variable resistor) is coupled to a low pass filter for adjusting the bass content of the input audio signal (House discloses the greater the light emitted by LED 104 the higher the frequency components of the signal (i.e. less bass content is passed through) (Column 5, lines 11-16). House does not disclose utilizing a capacitance multiplier circuit. Onetti et al. discloses a circuit for controlling frequency response characteristics of a signal (Figure 8) containing a capacitance multiplier. By selectively changing the resistors  $r_1$ ,  $r_2$ , and  $r_3$  (i.e. variable resistor) with switches  $s_1$ ,  $s_2$ , and  $s_3$  the phase response of the circuit can be obtained by equation by  $f_o = 1/(2\pi RC)$  (Column 4, line 1). Onetti et al. further teaches capacitance multiplying circuits are integrated in order to limit the number of components. Kimura as modified and Onetti et al. both disclose devices that alter the frequency response of a signal using a variable resistor in the form of a light sensitive resistor or a switching circuit. Therefore it would have been obvious to one skilled in the art at the time the invention was made to combine the capacitance multiplier circuit as disclosed by Onetti et al. with the light sensitive resistor disclosed by Kimura in order to reduce the number of components as taught by Onetti et al.

Regarding Claim 17, House further discloses responding to an increase in the input audio signal by energizing the light emitting device to produce a light source and decrease the resistance of the light sensitive resistor (House discloses the greater the amplitude the greater the light emitted by diode 104 and lower the resistance of the light

sensitive resistor 64) (Column 5, lines 6-16). Onetti et al. further discloses equation  $f_o = 1/(2\pi RC)$  (Column 4, line 1) which if the capacitor value was increased the corner frequency could change so bass boosting of the audio input signal is quickly removed.

Regarding Claim 18, House further discloses responding to a decrease in the audio input signal by de-energizing the light emitting device within the filter circuit in order to prevent a light source and increasing the resistance of the light sensitive resistor (House discloses the led light source 104 being proportional to signal amplitude and inversely proportional to the resistance of the light sensitive resistor 64 (Column 5, lines 6-16) which would prevent a light source if input was low enough. Onetti et al. further discloses equation  $f_o = 1/(2\pi RC)$  (Column 4, line 1) which if the capacitor value was decreased the corner frequency could change so bass boosting of the audio input is slowly added.

Regarding Claim 20, House further discloses the lower the resistance of light sensitive resistor 64 the higher the frequency of the components of the signal appearing (Column 5, lines 6-16) (i.e. the lower the resistance of the light sensitive resistor the less bass content is boosted).

Regarding Claim 21, House further discloses the light sensitive resistor 64 is optically coupled to LED 104 (Figure 2).

6. Claims 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over House (US Patent 4,809,338).

Regarding Claim 22, House discloses an automatic loudness compensation circuit (Figure 2) including a terminal coupled to an input audio signal from an external source (signal in 46) and a signal supply having voltage sufficient to drive an output audio speaker (signal from terminals 1 and 11 to speaker 38) comprising: a voltage detector for providing a voltage from the input audio signal with a range of frequencies where the lower portion of the range includes a bass content (House discloses a full-wave bridge rectifier for detecting an audio signal voltage on capacitor 100, from input signal through circuit 54, which inherently includes a range frequencies where a lower portion of the range includes a bass content (Column 4, lines 59-63), although House does not disclose the detector being an RMS detector, it is well known in the art that RMS detectors can be used to obtain the voltage level of a signal); a control circuit including a filter circuit (resistor and capacitor network including resistor 64) for adjusting a corner frequency associated with the filter circuit such that the corner frequency is inversely related to the input audio signal House discloses Figure 3 which describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal); a power amplifier (54) for increasing the power of the output signal from the low pass filter circuit (input to terminal 6); and a terminal for providing an amplified output signal (terminals 1 and 11).

Regarding Claim 23, House further discloses the greater the voltage the higher the frequency of the components of the signal appearing at the terminal of the amplifier for the speaker (Column 5, lines 6-16) (i.e. Filter allows less low frequency components

by decreasing of corner frequency of the circuit). Resulting in a bass boost which is inversely proportional to the corner frequency of the circuit.

Regarding Claim 24, House further discloses a light emitting device (Figure 2, reference 104) coupled to a light sensitive resistor (Resistor 64) which is coupled to a low pass filter (Column 2, lines 34-36).

Regarding Claim 25, House further discloses lower the resistance of the light sensitive resistor the higher the frequency components will be (i.e. less bass boost) (Column 5, lines 10-17) resulting in the bass boost being proportional to the resistance of the light sensitive resistor.

Regarding Claim 26, House discloses an automatic loudness compensation circuit (Figure 2) including a terminal coupled to an input audio signal from an external source (terminal 46) and a signal supply having voltage sufficient to drive an output audio speaker (output from terminals 1 and 11) comprising: means for detecting a voltage from the audio input signal with a range of frequencies where a lower portion of the range includes a bass content (House discloses a full-wave bridge rectifier for detecting an audio signal voltage on capacitor 100, from input signal through circuit 54, which inherently includes a range frequencies where a lower portion of the range includes a bass content) (Column 4, lines 59-63); means for adjusting a corner frequency of a filter circuit (LED 104 and resistor 64) such that the corner frequency is inversely related to the audio input signal; means for amplifying the output signal from the filter circuit (House discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input

audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal, i.e. filter allows less low frequency components by changing the corner frequency of the circuit) (Column 5, lines 6-16); and a terminal for providing an amplified output signal (terminals 1 and 11). Although House does not disclose the voltage detector being a RMS detector, it is well known in the art that RMS detectors can be used to obtain the voltage level of a signal as shown by Muterspaugh (Figure 1, reference 34, and 30).

7. Claims 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of Werrbach (US Patent 5,359,665), and House (US Patent 4,809,338).

Regarding Claim 27, Kimura discloses a system for obtaining a first order bass boost compensation comprising: a terminal for receiving an audio input signal having a signal level (A/D converter); a level control for determining the level of the input audio signal with a range of frequencies where a lower portion of the range includes a bass content (Volume Control 11); a control circuit for adjusting the corner frequency (controller 12) (Kimura discloses frequency response can range from 20 Hz to 500 Hz) (Column 4, line 13); an amplifier coupled to the output of the circuit (D/A Converter); and a terminal for providing an amplified output signal to an audio speaker (output of D/A converter). Kimura further discloses a voltage detector (reference 16) used to provide a voltage from the input audio signal (it is well known in the art that RMS detectors can be used to obtain the voltage level of a signal). Kimura further discloses a microphone

output can be used to control boosting characteristics (Column 4, lines 60-64). Kimura does not disclose a power supply voltage, a summing circuit, or corner frequency inversely related to input.

Werrbach discloses an audio bass frequency enhancement device (Figure 1) including an audio input signal (input to reference 1). Werrbach further discloses a summing circuit (combiner 4) which receives input from the audio signal and the automatic loudness compensation circuit (references 3 and 4). Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 through Column 2, line 2). Therefore it would have been obvious to one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal to produce a dynamically changing frequency response and longer duration of bass frequencies resulting in a higher fidelity audio signal.

House discloses a bass contour control network (Figure 2) which includes a power supply voltage of 12 to 16 volts (connection to reference 66). House further discloses a full-wave bridge rectifier for obtaining level of audio signal (Column 4, lines 59-63). House discloses Figure 3 which describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of

the circuit) (Column 5, lines 6-16) in order to enhance the sound quality at lower signal levels as determined by predetermined loudness contours (Column 5, lines 18-21). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Although House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17), Kimura also discloses that a feedback approach may be used to boost signal characteristics (Column 4, lines 60-64). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels as taught by House.

Regarding Claim 28, Kimura further discloses use in audio devices such as a compact disc player (Column 1, lines 26-28).

Regarding Claim 29, Kimura further discloses use in audio devices such as a tape recorder (i.e. cassette) (Column 1, lines 26-28).

Regarding Claim 30, Kimura further discloses use in audio devices which is inherently found on a digital video disc (Column 1, lines 26-28).

8. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura (US Patent 5,172,358) in view of Werrbach (US Patent 5,359,665), and House (US Patent 4,809,338).

Kimura discloses a system for obtaining an automatic loudness compensation (Figure 1) comprising: a input terminal for receiving an audio input signal having a signal level with a range of frequencies where a lower portion of the range includes a bass content (input to A/D converter); a level control coupled to the input terminal for determining the level of the input audio signal (Volume Control 11); an automatic loudness compensation circuit (Figure 1) having an output signal coupled to the level control comprising a filter circuit for adjusting a corner frequency associated with the filter circuit (Kimura discloses corner frequency can range from 20 Hz to 500Hz) (Column 4, line 13); an output terminal for providing an amplified output signal to an audio speaker (output of D/A converter). Kimura further discloses a microphone output can be used to control boosting characteristics (Column 4, lines 60-64). Kimura does not disclose a summing circuit for use with a microphone.

Werrbach discloses an audio bass frequency enhancement circuit (Figure 1) with an audio input signal (input to reference 1) and a summing circuit (combiner 4) which receives a input from the audio input and automatic loudness compensation circuit (Variable gain amplifier 3). Werrbach teaches the time and amplitude relationships between the audio signals in the two paths produces a dynamically changing frequency response characteristic and longer duration of bass frequencies after recombination of the two parts (Column 1, line 65 through Column 2, line 2). Therefore it would have been obvious to one skilled in the art at the time the invention was made combine the method of summing the input audio signal and the filtered signal with the control circuit as disclosed by Kimura to produce a dynamically changing frequency response and

longer duration of bass frequencies resulting in a higher fidelity audio signal. Kimura as modified does not disclose a power amplifier coupled to the summing circuit for increasing the power of the output signal from the summing circuit or the corner frequency is inversely related to the audio input signal.

House discloses a controllable bass contour device (Figure 2) including a power amplifier (reference 9) for increasing the power of an audio signal. House further discloses Figure 3 that describes low frequency boosting being maximum at low frequencies and minimum at high frequencies (i.e. inverse to input audio signal) (Column 5, lines 22-31) and the greater the amplitude (i.e. volume) the higher the frequency of the components of the signal appearing at the input terminal (i.e. filter allows less low frequency components by decreasing of corner frequency of the circuit) (Column 5, lines 6-16). Both Kimura and House disclose methods of providing loudness compensation using the level of an audio signal to manipulate a boosting filter. Although House uses a feedback approach as described in Figure 2 (Column 4, line 55 - Column 5, line 17), Kimura also discloses that a feedback approach may be used to boost signal characteristics (Column 4, lines 60-64). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the low-pass frequency boosting circuit as described by Kimura with the inverse frequency response as disclosed by House in order to enhance the sound quality at lower signal levels as taught by House (Column 5, lines 18-21).

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JIM



XU MEI  
PRIMARY EXAMINER